

3. Preliminary Notice of the Isopoda collected during the Voyage of H.M.S. 'Challenger.'—Part II.¹ *Munnopsidæ*. By FRANK E. BEDDARD, M.A., F.R.S.E., F.Z.S., Prosector to the Society².

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The family of the Munnopsidæ, originally founded by Prof. M. Sars on a single species, *Munnopsis typica*, is now known to include a large number of species, which have been referred by Prof. G. O. Sars to four distinct genera, viz.: *Munnopsis*, *Desmosoma*, *Ilyarachna*, and *Eurycope*; the majority of these Isopoda have been dredged off the coast of Norway by G. O. Sars; *Munnopsis typica* and *Eurycope gigantea* have been described as occurring in the Arctic region, and two species *Munnopsis typica* and *Eurycope robusta* have been recorded by Harger from the E. coast of N. America. Beyond a few scattered observations in papers communicated to the Royal Society of London (Proc. Roy. Soc. 1874) by the late Dr. v. Willemoes Suhm, nothing is known of the forms which inhabit the southern hemisphere. The specimens dredged by the 'Challenger' nearly all come from the antarctic area; they are referable to fourteen distinct species, including one new genus. I have named them as follows:—

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| 1. <i>Eurycope sarsii</i> . | 8. <i>Eurycope intermedia</i> . |
| 2. <i>Eurycope novæ-zealandiæ</i> . | 9. <i>Ilyarachna</i> , sp. |
| 3. <i>Eurycope atlantica</i> . | 10. <i>Munnopsis latifrons</i> . |
| 4. <i>Eurycope fragilis</i> . | 11. <i>Munnopsis australis</i> . |
| 5. <i>Eurycope pellucida</i> . | 12. <i>Munnopsis gracilis</i> . |
| 6. <i>Eurycope abyssicola</i> . | 13. <i>Acanthocope spinicauda</i> . |
| 7. <i>Eurycope spinosa</i> . | 14. <i>Acanthocope acutispina</i> . |

All these species are, with the exception of *Ilyarachna*, inhabitants of deep water.

MUNNOPSIS, Sars.

Three out of the fourteen Munnopsids obtained by the 'Challenger' appear to me to be referable to the genus *Munnopsis*; in one instance (*M. gracilis*) there can be, I should imagine, but little doubt of the correctness of this identification. Both the remaining species diverge somewhat in structure from *Munnopsis typica*; the differences are, however, perhaps not greater than those which separate different species of other genera (e. g. *Desmosoma*), and I prefer, therefore, for the present at least, to retain both species within the genus *Munnopsis* without pledging myself definitely.

1. MUNNOPSIS GRACILIS, n. sp.

A single specimen of this species was dredged off the North Island of New Zealand in 1100 fathoms of water.

The single specimen is a male and measures 1.2 millim. in length.

¹ See P. Z. S. 1884, p. 330.

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As in *M. typica* the anterior part of the body, consisting of the head and of the first four segments of the thorax, is wider than the posterior region of the thorax and the abdomen; the first segment of the thorax is the smallest, the second is the largest and projects considerably dorsally above the general surface of the body; the two next segments are a trifle smaller and subequal. The fifth segment is triangular in shape, very narrow anteriorly, and wider posteriorly; it is longer than either of the succeeding segments, which are very short; the seventh is almost fused with the abdominal segment; the latter is long, with a narrow median raised area; it terminates in two minute posterior tubercles, outside of which are the uropoda. The surface of the body is smooth and devoid of spines.

The mandibles have no palp.

Station 168, 1100 fathoms.

2. MUNNOPSIS LATIFRONS, n. sp.

A single example, female, measuring 15 millim. in length, from N. Pacific, off Japan.

The head is long in proportion to the other segments; it is as long as the first three taken together; the first four segments of the thorax appear on a dorsal view to be subequal; the lateral regions, however, increase progressively in length from before backwards; the segments are excavated above. The three posterior segments of the body do not differ widely in transverse diameter from the anterior segments as they do in *M. typica*; their shape is more like that of *Eurycope*; the first of these segments is decidedly the shortest in the dorsal region, laterally they are all subequal in antero-posterior diameter. The abdomen is rather damaged, it appears to be oval in form, and rounded off at its free extremity; laterally, and in front of the articulation of the long styliform uropoda is a spiny process directed backwards; the antennæ are of great length, measuring 87 millim.; the flagellum is very much shorter than the last joint of the peduncle, measuring only 5 millim. The mandible has a palp.

The first pair of thoracic appendages form a very distinct prehensile band; the last three pairs of appendages are natatory and like those of *M. typica*.

Station 232, 345 fathoms.

3. MUNNOPSIS AUSTRALIS, n. sp.

The third and last species which I refer to this genus is represented by a single individual, dredged between Prince Edward's Island and the Crozets. It measures 8 millim. in length.

The body has the typical form of the genus. The first segment of the thorax is very short, the second five or six times as long, and subequal with the two next. The width of the body is greatest at the second segment. The remaining segments of the thorax (5-7) are extremely narrow; the first of those segments is very much the longest, perhaps three times as long as either of the following.

The abdomen is long and narrow, about as long as the last three segments of the thorax; it terminates in a short conical process.

The antennæ are very long, measuring about 36 millim.; the flagellum is about as long as the peduncle, and is not distinctly jointed.

The mandibles are conical in form, with only a single tooth-like process; they have no palp.

The uropoda are short and uniramous, biarticulate.

Station 147, 1600 fathoms.

EURYCOPE, Sars.

Of the eight species described in the following pages, four have been assigned to the genus *Eurycope*, chiefly as a matter of convenience. *E. novæ-zealandiæ*, *E. fragilis*, *E. atlantica*, and *E. intermedia* are, I am convinced, rightly assigned to this genus; of the other species, *E. sarsii* and *E. spinosa* are probably rightly placed, while with regard to *E. pellucida* and *E. abyssicola* I do not feel capable of pronouncing a decided opinion; they may be the representatives of a new genus altogether, but the specimens are so imperfect that I do not feel justified at the present moment in removing them from *Eurycope*, especially since there are no strong reasons to be deduced from the organization of the species, which are decidedly against such a view of their affinities.

1. EURYCOPE NOVÆ-ZEALANDIÆ, n. sp.

Of this species a large number of individuals were dredged off the N. island of New Zealand. The largest examples measure up to 12 millim. in length.

The head is smooth and narrower than the first segment of the thorax; the four first thoracic segments are excavated dorsally and increase gradually in lateral diameter up to the fourth, which is the widest; the antero-posterior diameter of the first segment is considerably longer than the three succeeding segments, which are subequal. In the median dorsal line of segments 2-4 (inclusive) is an upright spiny process directed somewhat forwards. The lateral margins of segments 3 and 4 are prolonged into a forwardly directed spine; two similar spines are found upon the epimera of these and of the preceding segments. The three posterior segments of the thorax are directed backwards; they are closely adpressed and convex dorsally; on either side of the median dorsal line of each segment is a pair of blunt tubercles which in other species (*E. fragilis* and *E. atlantica*) are prolonged into spines; the lateral margins of these segments are directed forwards as spiny processes. The abdominal segment is roughly triangular in form, terminating in an obtusely pointed extremity; just in front of the articulation of the uropoda is a short lateral process on either side; the antero-lateral margins are prolonged into short, flattened, spiny processes corresponding with those upon the thoracic segments.

The antennæ are rather more than twice the length of the body.

The uropoda are biramous and very minute; the inner branch shorter and more slender than the outer branch.

Station 168, 1100 fathoms.

2. EURYCOPE SARSII, n. sp.

This is one of the largest species of the genus, and was dredged at two stations between Prince Edward's Island and the Crozets.

The length of the largest individual is 24 millim.

The head is about equal in size to any of the anterior segments of the thorax. The first four segments of the thorax are of about the same antero-posterior diameter, the fourth being, if anything, rather narrower than the rest; the lateral diameters of these segments progressively increase, so that the fourth is the widest. The upper surface of these segments, as of the body generally, is utterly devoid of spines or tubercles which are often found in this genus; the first four thoracic segments are concave dorsally, the rest convex; the lateral margins of the terga, as well as of the epimera in the anterior segments of the body, are prolonged into a short forwardly directed spine. Of the posterior thoracic segments the lateral margins are prolonged into a flattened spine; this is also the case with the antero-lateral margins of the abdominal segment. The abdominal segment is bent down at its extremity; as in *E. novæ-zealandicæ* and other species the surface is divided into two lateral and a median convex area by shallow furrows; there are no lateral processes as in other species, nor is the extremity prolonged but is abruptly truncated.

The antennæ and thoracic appendages were all lost.

The mandibles are furnished with a three-jointed palp, the last joint set transversely and somewhat clawed; the mandible terminates in a number of stiff tooth-like processes, below there is a tuft of slender hairs; the molar process is long and beset with fine hairs.

The uropoda are minute and biramose.

Station 146, 1375 fathoms; Station 147, 1600 fathoms.

3. EURYCOPE INTERMEDIA, n. sp.

This small species is represented by a single individual, 9 millim. in length. The anterior margin of the head is prolonged into a short rostrum, which is bifid at its tip. The first four segments of the thorax are subequal in length, they are excavated above; in the dorsal median line of all these segments is a short spine; the lateral margins of these segments with the possible exception of the fourth, are not prolonged into spines; but the epimera are so prolonged. The three posterior segments of the thorax have each a pair of short spines, one on either side of the dorsal median line. The shape of the abdominal segment readily serves to distinguish this species from any of its allies; as in *E. fragilis* the abdominal segment is notched on either side and front; beyond the notch is a short transverse process which overlies the uropoda; the terminal extremity is smooth and rounded off, and not prolonged into a spine.

Station 252, 2740 fathoms.

4. EURYCOPE ATLANTICA, n. sp.

This species is represented by a single specimen dredged in the North Atlantic.

The specimen measured 10 millim.

The species is very closely allied to *Eurycope fragilis*. The head is long, equalling the two first segments at the thorax taken together; it has a pair of hooked spines, one on either side of the median line. Of the first four segments of the thorax, the first is rather shorter than the rest, which are subequal; the three last of these segments are furnished with a longish median spine; the lateral margins of these segments, as in so many other species, are prolonged into a forwardly directed spine.

The three posterior segments of the thorax have the form characteristic of the genus; the two first of these segments have a pair of median dorsal spines, which appear to be wanting on the third.

The abdominal segment is somewhat oval in form, and terminates behind in an obtusely pointed extremity; in front of the articulation of the uropoda are a pair of lateral spines which are curved forwards in a crescent shape; in front of these, and near to the antero-lateral margin, are another pair of spines. On the dorsal surface are also a pair of spines, situated one behind the other.

Station 76, 900 fathoms.

EURYCOPE, sp.

At Station 147 a fragment of an Isopod was obtained, which I refer doubtfully to the above species; it consists of the last three segments of the thorax and the first half of the abdomen; all these thoracic segments have a pair of median spines, and there are two dorsal spines upon the abdomen; the size of the fragment indicates a specimen of about 20–25 millim. in length.

Station 147, 1600 fathoms.

5. EURYCOPE FRAGILIS, n. sp.

This species has a greater horizontal and vertical distribution than any of those obtained by the 'Challenger.' A large specimen, measuring 30 millim., was dredged in the Antarctic Ocean south of Kerguelen; another specimen, smaller, between Prince Edward's Island and the Crozets; and a third between Kerguelen and Australia; finally, a number of small individuals were dredged off the coast of Japan in the North Pacific.

This species is nearly allied to *E. atlantica*, but differs from it in the following points:—there are no spines developed upon the head, which is smooth and convex as in the majority of species. The abdomen differs very much in shape in the two species; in the present species it is wide and more triangular in form; the anterior lateral spines are nearer to its articulation with the last segment of the thorax; there is only one spine upon the dorsal surface of the abdomen, situated near to the proximal extremity.

Station 152, 1260 fathoms; Station 147, 1600 fathoms; Station 158, 1800 fathoms; Station 237, 1875 fathoms.

6. EURYCOPE PELLUCIDA, n. sp.

The present species is quite the largest of the family Munnopsidæ.

The single specimen (a male), from near New Guinea, measures 45 millim. in extreme length.

A remarkable peculiarity of this species is that the integument, instead of being firm and calcified as in Crustaceans generally, is delicate and transparent. The head is large and convex dorsally; the first segment of the thorax is very short; the second and third are subequal, and slightly longer than the first; the fourth segment is as long as the second and third taken together. All these segments are concave dorsally; they are furnished with short epimera. The segments themselves occupy a very small region of the body compared to other species; the length of the four segments taken together is only 5 millim., while that of the next three is 18 millim.

The three posterior segments of the thorax are approximately of equal size; their shape is not unlike that of other species of the genus.

The abdominal segment is large, but it is so collapsed that it is impossible to give an accurate description. It appears to resemble very closely that of *E. sarsii*; the posterior extremity is much bent down, so that on a lateral view the abdominal segment is semi-circular in outline, the anus being directed downwards and even a trifle forwards.

The body of this species is entirely devoid of any spines.

All the thoracic appendages, as well as the antennæ, have been broken off short.

The mandibles are stout and powerful, and appear to be without a palp.

Station 218, 1070 fathoms.

7. EURYCOPE ABYSSICOLA, n. sp.

This species, like the last, is remarkable for the extreme delicacy and transparency of the integument; this character is almost more conspicuous in *E. abyssicola* than in *E. pellucida*.

The single specimen, which was dredged in the N. Atlantic, measures 40 millim. It presents a good many resemblances to *E. pellucida*.

The head is convex dorsally; the first four segments of the thorax are very short, and together measure no more than the fifth segment alone; they increase progressively in length. Of the three posterior segments of the body the middle one appears to be rather the largest, while the first and third are subequal. The abdominal segment is so damaged, that it is impossible to give any idea of its size and shape.

The mandibles have no palp.

The thoracic appendages of the first and sixth pairs have been preserved. The first pair appears to resemble the same appendages of other species of *Eurycope*; the sixth pair are modified into foliaceous swimmerets; but in these appendages only of the antepenultimate the flattened and dilated joint has been preserved; it is of comparatively enormous size.

Station 68, 2175 fathoms.

8. EURYCOPE SPINOSA, n. sp.

Another very remarkable form is the present species, which is

unfortunately only represented by a fragment, dredged near the Antarctic ice-barrier from a depth of 1950 fathoms.

The head and the first four segments of the thorax (all that is left of the specimen) are subequal in length; each of the four thoracic segments is furnished with a long slender spine in the dorsal median line; the last three segments have in addition a pair of more laterally placed spines, which are absent from the first segment of the thorax but present upon the head, and situated a little way behind the articulation of the antennæ. On the epimera were also two or three long spines. The ventral side of the body is comparatively smooth; each of the segments, however, has a minute median spine nothing to compare with those on the dorsal surface, which equal or exceed in length the diameter of the body.

Station 157, 1950 fathoms.

ACANTHOCOPE, nov. gen.

Two individuals, apparently representing as many species of a Munnopsid from the southern hemisphere, I regard as the type of a new genus.

The characters of the genus may be stated in the following words:—

General form of the body oval; no marked difference in breadth between the anterior and posterior regions of the thorax. Anterior segments of the thorax increase progressively in length; the posterior segments of thorax subequal; epimera of all the thoracic segments from the second onwards enormously elongated into curved sickle-shaped spines. The abdominal segment is oval, with a long terminal spine nearly twice its own length and two pairs of lateral spines, one more anterior, the second overlying the articulation of the uropoda; from the inferior surface of the abdominal segment, beneath the articulation of the latter, arises another pair of long spines. Antennæ with the two basal joints short, and furnished with one or two long lateral spines. Mandibles divided into several tooth-like processes; molar process stout and powerful, with a blunt edge suitable for crushing; palp small and three-jointed. First two pairs or first pair only of legs shorter and more slender than the rest, the two or three following pairs subequal and not greatly elongated. Posterior thoracic appendages natatory. Uropoda long, styliform, 3- or 5-jointed.

1. ACANTHOCOPE SPINICAUDA, n. sp.

A single male specimen was dredged between Kerguelen and Australia at a depth of 1800 fathoms.

It measures about 7 millim. in length, inclusive of the telson spine.

The general form of the body is oval; the first four segments of the thorax are short, gradually increasing in length up to the fourth; the three posterior segments are together twice as long as the four anterior; all the thoracic segments, with the exception of the first, are furnished with long spiniform epimera; on the first four thoracic

segments is a single median spine, one on either side of the median line on each of the three succeeding segments. The abdomen is oval in shape, with an immensely elongated telson spine twice the length of the abdomen itself. On either side are a pair of lateral spines, the posterior being placed dorsal to the articulation of the uropoda; from the ventral surface of the caudal shield behind the uropoda arises another spine, which is shorter in this species than in the next to be described. The uropoda are 5-jointed.

Station 158, 1800 fathoms.

2. ACANTHOCOPE ACUTISPINA, n. sp.

A single specimen, apparently a female, of this species was dredged off the west coast of Patagonia.

The specimen measures 5 millim. in length.

It has the same general form as the last species; but the three posterior thoracic segments, instead of being together double the preceding thoracic segments, are only equal in length to the second, third, and fourth of these segments. The upper surface of the body in this species has not the median spines described in *Dolichurus spinicauda*. The epimeral spines are of comparatively much greater length than in the last-described species, and they, as well as the general body-surface, are closely beset with short spines; these structures are also present in *A. spinicauda*, but apparently not to so large an extent.

The abdomen has the same general form as in the last species; but the terminal spine of the telson is much shorter, being only about equal in length to the abdomen.

The two first appendages of the thorax are shorter as well as more slender than the succeeding.

The uropoda are 3-jointed.

Station 302, 1450 fathoms.

Geographical and Bathymetrical Distribution.

Although the Munnopsidæ dredged by the 'Challenger' were in nearly every cases from very deep water, the genera of this family do range into shallow water considerably above the 300-fathom line, which is supposed with reason to represent approximately the boundary line between the abyssal and shallow waters. Nearly all the species described by Sars are from comparatively shallow water, though several descend into water of 300 to 500 fathoms in depth, e. g. *Eurycope gigantea*, 525 fathoms. In the southern hemisphere only one species has been found to inhabit shallow water. A Munnopsid was obtained on the shores of Kerguelen, which are so productive in other Isopoda, notably in the genus *Serolis*; this is a species of the genus *Ilyarachna* which I have not at present determined with certainty.

The majority of the deep-sea species were obtained in the vicinity of land, for example, near to New Zealand and to the coast of South America. In many instances stations situated at vast distances from any land (such as Stations 157 and 158 between Australia and

Kerguelen in the southern hemisphere, and Station 252 in the middle of the North Pacific) yielded examples of the family. The distribution of this family over the floor of the ocean appears to be much wider than that of any other family of the Isopoda. While the genera *Serolis*, *Arcturus*, and others, of which the 'Challenger' obtained specimens from the deep sea, were almost invariably obtained in the immediate vicinity of land, this was by no means invariably the case with the Munnopsidæ.

The frequent occurrence of more than a single species at the same station appears to show that this family is largely represented in the abyssal fauna. At Station 146, for example, three distinct species were obtained, viz. *Eurycope sarsii*, *E. fragilis*, and *Munnopsis australis*.

The wide range of certain species is of importance. *Eurycope fragilis* ranges from Borneo in the north to near Kerguelen, and close to the antarctic ice-barrier in the south. *Acanthocope spinicauda* from Station 158 is represented off the west coast of Patagonia by *Acanthocope acutispina*, which only differs slightly from it. The greatest depth which any Munnopsid is known to inhabit is 2175 fathoms; a single specimen of *Eurycope abyssicola* was dredged from this depth at Station 68 in the Atlantic.

In my Report on the genus *Serolis* I pointed out that in *Serolis Bromleyana* and *S. antarctica*, which have a comparatively wide range, the individuals from the more southern localities are considerably larger than those that inhabit the more northern latitudes. This is strikingly shown in the case of *Eurycope fragilis*. The more southern forms of this species are considerably larger than the northern forms.

Nearly all the species of Munnopsidæ described by Sars and others are of comparatively puny dimensions, the largest being *Eurycope gigantea*, which attains the length of 33 millim. In striking contrast are many of the specimens obtained from deep water both in the northern and southern hemispheres by the 'Challenger;' as instances, may be mentioned *Eurycope pellucida*, which measures nearly 2 inches in length, and *E. fragilis*, which measures $1\frac{1}{2}$ inch. In this group, as in so many others which are represented both in deep and shallow water, the deep-sea species attain to the largest size.

Several of the new species described in the present paper are remarkable. *Eurycope spinosa* is unique by reason of the great development of spines upon the dorsal surface of the body; this character has not been met with in other Munnopsidæ, which have at most a covering of slender hairs, or a few spines, as in *Eurycope atlantica*. The development of spines upon the body is a character met with in other deep-sea Crustacea, though its meaning is not clear.

Another very remarkable species is the one which I have named *Eurycope pellucida*. As its name implies, it is transparent, the integument being thin and but little calcified; the condition of the specimen might naturally suggest that it had just changed its skin, if a well-developed colony of Hydroids upon some of the segments

did not show this supposition to be erroneous. The extreme delicacy and fragility of the specimen has unfortunately resulted in the loss of nearly all the appendages, and the specimen is broken in half. It is not merely, however, the thinness and absence of calcification in the integument that makes this species so brittle; the muscles, both of the appendages and of the segments themselves, are so little developed that it is almost impossible to detect their presence with the unaided eye. This is the only family of Isopods in which I have observed a similar feeble development of the musculature, which is well known to be characteristic of many deep-sea fishes. *Eurycope fragilis* approaches *E. pellucida* in the transparency of the integument, and in the third species, *E. abyssicola* these peculiarities are even more developed; the specimen, however, is so collapsed and damaged that it is impossible to say much about it.

4. Descriptions of some new Species and a new Genus of Phytophagous Coleoptera. By MARTIN JACOBY.

[Received November 27, 1885.]

DORYPHORA PRÆTEXTATA, sp. nov.

Below piceous; above pale green. Head and the disk of the thorax piceous, closely punctured; elytra closely geminate, punctate-striate, a sutural stripe widened at the middle, piceous.

Length $4\frac{1}{2}$ lines.

Head finely and closely punctured; labrum fulvous; antennæ black, the three lower joints testaceous below, the apex of the terminal joint fulvous. Thorax very finely and rather closely punctured, the sides slightly rounded in front, nearly straight at the base, the angles acute but scarcely produced: a large piceous patch, widened at the base, occupies the middle of the disk. Scutellum piceous. Elytra rather finely punctate-striate; the punctures arranged in slightly irregular double rows, with the exception of the last row, near the lateral margins, which consist of single punctures only; the sutural longitudinal piceous stripe is distinctly widened at the middle, and gradually narrows towards the apices; the meso-sternal process short and straight.

Hab. Amazons, St. Paulo d'Oliveira. (Coll. Oberthür and my own.)

This species may easily be mistaken for a variety of *D. trivittata*, Baly, in which the lateral elytral stripe is wanting; but the double rows of punctures of the elytra show it to be distinct. In *D. trivittata*, as well as in *D. citrinella*, Kirsch, the elytra have single rows of punctures; the same is the case in *D. vespertina*, Baly, another closely allied species.

DORYPHORA GRATIOSA, sp. nov.

Black. Head, thorax, and antennæ dark piceous, the four last joints of the latter fulvous; elytra pale green, finely punctate-striate,